View Abstract

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TITLE: Opportunities for Laboratory Opacity & Chemistry Studies to Facilitate Characterization of Young Giant Planets and Brown Dwarfs

ABSTRACT BODY:

Abstract Body: The thermal emission spectra of young giant planets is shaped by the opacity of atoms and molecules residing in their atmospheres. While great strides have been made in improving the opacities of important molecules, particularly NH_3 and CH_4, at high temperatures, much more work is needed to understand the opacity and chemistry of atomic Na and K. The highly pressure broadened fundamental band of Na and K in the optical stretches into the near-infrared, strongly influencing the shape of the Y and K spectral bands. Since young giant planets are bright in these bands it is important to understand the influences on the spectral shape. Discerning gravity and atmospheric composition is difficult, if not impossible, without both good atomic opacities as well as an excellent understanding of the relevant atmospheric chemistry. Since Na and K condense at temperatures near 500 to 600 K, the chemistry of the condensation process must be well understood as well, particularly any disequilibrium chemical pathways. Comparisons of the current generation of sophisticated atmospheric models and available data, however, reveal important shortcomings in the models. We will review the current state of observations and theory of young giant planets and will discuss these and other specific examples where improved laboratory measurements for alkali compounds have the potential of substantially improving our understanding of these atmospheres.

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